CRES REPORT

The Center For
Reproduction of
Endangered Species

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White rhinoceroses

FEMALE HORMONE RESEARCH CONDUCTED AT CRES

A primary goal of The Center for Reproduction of Endangered Species is to establish reproductively self-sustaining groups of endangered species. In most cases little to nothing is known about the manner in which these animals control their reproduction. Laboratory animal and human studies, which have been conducted for more than 50 years, have shown that the ovaries in females and testes in males secrete chemicals, hormones, which coordinate internal events so that reproduction may occur. The endocrinology laboratory under the direction of Dr. Bill Lasley has developed non-invasive methods to monitor similar hormonal patterns in zoo animals. Information gained from Dr. Lasley's studies of several endangered species indicates that each species handles its hormonal signals somewhat differently than others.

African elephants

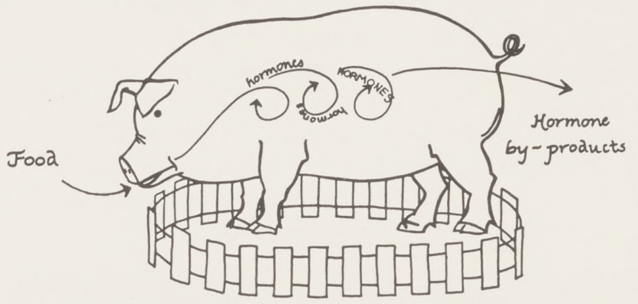
Addax and calf

Reproductive Patterns

The large amount of information available concerning hormonal regulation of reproduction of laboratory rodents and humans can be compared to newer information from hyenas, cheetahs, monkeys, apes and other zoo animals enhancing our understanding of their reproductive patterns. But much remains which we do not know, even within familiar areas. For example, the extensive work with laboratory animals has not yet produced a complete understanding of reproductive failure in otherwise apparently healthy women.

Monitoring Hormonal Production

Much effort has been expended at the San Diego Zoo to provide an environment for species within the collection which optimizes their opportunity to produce offspring. Groups of behaviorally-compatible animals have been established. Genetic history of these animals has been taken into consideration to minimize inbreeding defects in the young. Yet there is still a degree of infertility, even in the most successful groups. The endocrine laboratory has investigated this unexplained lack of fertility by monitoring hormonal production by individual animals.



The above illustration displays the general approach used by the endocrine staff to study animals. Non-invasive monitoring involves testing urine and feces much in the way it is done in medical laboratories for humans. The diagram shows hormones are made in the body and hormone-like substances are eaten in food. Both kinds of hormones affect the animal and are excreted over time into urine.

A Variety of Estrogens

An important group of female hormones are collectively known as estrogens. The presence or absence of these estrogens allow the endocrinologist to evaluate: whether a particular female if mated could conceive, if she is pregnant, when to predict delivery of the offspring, and in some cases the health of the developing fetus. Measurements of estrogens, however, are complicated by the variety of chemicals which fall under the broad title of estrogen. An estrogen by definition is a substance which causes a change in a female reproductive organ. At present, the list of estrogens includes at least 20 true hormones produced in animals, plus an ever expanding list of plant estrogens and man-made chemical substances including pesticides and drugs.

Estrogen Detecting Techniques

Lion-tailed macaques

Techniques have been developed in Dr. Lasley's laboratory to simultaneously detect all estrogens present in our female animals regardless of their source. This eliminates guessing which of the possibilities might be influencing reproductive function in a particular animal. For example, in the course of studies of pregnancy in our lion-tailed macaques, a large amount of a plant estrogen was detected. This particular plant estrogen has been studied extensively by researchers in Australia. When eaten by sheep this plant estrogen causes infertility, uterine cysts and death of the fetus. Dr. Margaret Thompson, whose training at the University of California-Davis was in the area of estrogens and their control of reproductive processes, has worked with Dr. Lasley the past two years evaluating the importance of this compound in the lion-tailed macaques. Results have shown the lion-tailed macaque is protected from damage from this plant estrogen because its own hormonal production during pregnancy is different than that of sheep. We do not know if our other primates are so fortunate. Venereal warts, abnormal swelling of the sexual organs and breasts have been observed in several of our other primates. Those particular animals have not produced offspring although they have been bred. More work is required to determine whether estrogens, possibly of dietary origin, are responsible for this infertility.

Cancer in Reproductive Organs

An important by-product of these studies to ensure survival of our zoo animals may be new information about a serious threat to the quality of life, i.e., cancer in reproductive organs (cervix, uterus, breast, prostate). How cancer develops is not known, although it is generally accepted that hormones are somehow involved in the transformation of normal to malignant tissue. New information obtained from studies of zoo animals will provide insights into subtleties in the ways hormones cause changes in reproductive tissues.

Cheetah cub

A Better Understanding

CRES does not assume that its efforts will reverse the process of extinction in all endangered species. But it has the opportunity and the tools to ensure survival of many. In addition, even in cases where CRES researchers lose, the new information obtained in trying will contribute greatly to understanding how hormones cause changes, not all of which are beneficial, in reproductive organs.

Gorillas

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